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Satellite-based coastal bathymetry for annual monitoring on the Mediterranean coast: A case study in the Balearic Islands

Sandra Viana-Borja[1], Angels Fernández-Mora[2], Richard P. Stumpf[3], Gabriel Navarro Almendros[1], and Isabel Caballero de Frutos[1]

[1]Institute of Marine Sciences of Andalusia (ICMAN), National Research Council (CSIC), Ecology and Coastal Management, Puerto Real, 11510 Spain (sandra.viana@csic.es)
[2]Coastal Ocean Observing and Forecast System Balearic Islands ICTS (ICTS SOCIB), Naorte, 07121, Palma de Mallorca, Spain (mafernandez@socib.es)
[3]National Centers for Coastal Ocean Science, NOAA National Ocean Service, East West Highway, Silver Spring, MD, 20910, USA. (richard.stumpf@noaa.gov)

More than 60% of the world's population lives near coastal zones. These are the most productive as well as the most vulnerable ecosystems in the world. Considering these, among other factors, the study of coastal zones is a matter of vital importance, so that it is necessary to have accurate information for an appropriate coastal management. The shallow bottom topography is considered one of the most critical parameter in coastal studies, because of its significance in different areas such as industry, navigation, defense, aquaculture, tourism, maritime planning, and environmental management, among others. The bathymetry is one of the biggest challenges for coastal engineers and scientists, since it is quiet complex to gather accurate data and to keep it updated because it is a time-consuming and very expensive process. In recent years, satellite-derived bathymetry (SDB) has emerged as an alternative to the most common survey techniques. In the present case study, a recently developed multi-temporal SDB model is applied to overcome problems associated with turbidity and noise effects. This model had been applied in many areas of the Caribbean and EEUU coasts with outstanding performance, providing an accurate bathymetry of the selected areas. In this case, it has been analyzed the bottom topography changes in the Cala Millor beach (Mallorca Island, Spain) between 2018, 2019 and 2020, using images from the Sentinel-2A/B twin mission of the Copernicus Programme. ACOLITE processor has been applied to Sentinel-2 L1A images for atmospheric and sunglint correction. The study aims at demonstrating the effectiveness of this model in the Mediterranean region to show its consistent performance on distinct geographic zones around the world, in addition to improving the results with a composited multi-temporal image selected automatically. Showing the confidence of this capability to be applied in any micro-tidal coast around the world may enhance the existing survey methods and highly contribute to the scientific knowledge by providing scientists and engineers with new science-based tools to better understand coastal zones.